

FETATRACK & VASCUTRACK 120 SERIES SERVICE MANUAL

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SECTION 1

GENERAL INTRODUCTION

1.0 INTRODUCTION

This service manual is written to aid in the maintenance and repair of the SEWARD MEDICAL SYSTEMS FETATRACK and VASCUTRACK 120 series of Doppler detectors. Servicing of this equipment should be performed by a qualified technician after carefully studying this manual.

The drawings and circuit descriptions in this manual are correct as of the date it was prepared, but the manufacturer reserves the right to make changes to improve the operation of the instrument. If your instrument does not exactly match the manual, contact the manufacturer or distributor for revision information.

Inspect the instrument upon receipt for damage, dents, or scratches. If damage is found notify SEWARD MEDICAL SYSTEMS promptly at the following address :-

Seward Medical Systems Ltd
Techbase
Cleppa Park
Newport
Gwent NP1 9UG
United Kingdom

Telephone (01633) 810770

FAX (01633) 810498

Retain the packing material for possible future use.

In the unlikely event that the instrument must be returned to for service or shipped for any other reason, use the same packing material in which the instrument was delivered. If this is not available, the instrument should be packaged in a proper size box with adequate protective padding.

1.1 RE - ORDER INFORMATION

Listed below are the consumables used with the FETATRACK/VASCUTRACK 120 series Pocket Dopplers complete with part numbers for ease / simplification of ordering.

Part Number	Description
9000-0005	Aquasonic Gel 0.25L
9000-0006	Aquasonic Gel 60 gm
9020-1604	MN1604 Alkaline Battery

1.2 SYMBOLS

The following symbol has been used on the rear of the FETATRACK/VASCUTRACK 120 and is here defined according to IEC601 and B.S.5724.

IEC Symbol 878-02-02 Type B Equipment

1.3 CE MARK

As indicated in the operating manual and identified on the outer packing, this product complies with the essential requirements of the European Council Directive 89/336/EEC relating to EMC.

1.3.1 Guidelines for identifying and resolving adverse EMC conditions

This product is classified as a Class A Group 1 type of product according to EN55011. This product is allowed in domestic establishments under the jurisdiction of a Healthcare professional.

Emissions

Care has been taken through the design and manufacturing process to minimise the EM emissions which may be produced by this equipment, however, in the unlikely event that the unit causes an EM disturbance to adjacent equipment, we suggest that the procedure is carried out 'out of range' of the affected equipment.

Immunity

If the user has any doubt regarding the unit's EM immunity during routine operation, we suggest that the source of EM disturbance is identified and its emissions reduced.

If the user has any doubt regarding the identification and resolution of adverse EM conditions, they should contact Seward Medical Systems directly who will advise on the situation. The address can be found in the front of this manual.

SECTION 2

DESCRIPTION OF THE INSTRUMENT

2.1 AUDIO UNIT

BATTERY LOW - LED indicator to show when the battery has reached a point when it requires changing.

VOLUME - Rotary edge potentiometer which increases or decreases the setting of the volume.

HEADSET - An audio output for connection to an audio stethoscope, for private listening.

TAPE OUTPUT - 3.5mm Stereo jack for connection to a standard tape recorder in mono, on the Ring of the stereo jack is the Waveform output for connection to an ECG recorder.

TRANSDUCER CONNECTOR - For the connection of any compatible Seward Medical Systems detection transducer. Note some variants have a fixed transducer.

2.2 DISMANTLING INSTRUCTIONS

Note:- Before dismantling the unit, unplug the transducers and accessory cable (if present).

2.3 AUDIO UNIT

The Audio unit houses the main circuit board, to remove the circuit board turn the unit on it's front and remove the three M3 countersunk screws. The back panel will now come away revealing the reverse side of the PCB. Remove the two M3 screws securing the PCB. The PCB is attached to the unit via an 8 way connector, carefully remove the connector and the PCB can be pulled clear of the case.

2.4 TRANSDUCERS

Circuit board removal is carried out by unscrewing the two M2 screws in the end of the probe cover and carefully sliding the probe cover back up the cable. This will reveal the circuit board mounted in it's cradle. WE DO NOT recommend removing this from the cradle, however if it is necessary to do so, with extreme care unsolder ALL the wires (cable and faceplate terminations) joining the PCB and press it out of the cradle.

SECTION 3

CIRCUIT DESCRIPTION

3.1 INTRODUCTION

The circuitry has been divided into functional blocks with each block being described separately, the blocks are as follows:

- Audio Unit Power Supply
- Battery Low Indicator
- Ultrasound Transducer
- Oscillator and Detector
- Oscillator and Transmitter Amplifier
- Receiver and Detector
- Audio Amplifier
- Velocity Processor
- Controls and Indicators
- Unit ON / OFF
- Battery Low

3.2 AUDIO UNIT POWER SUPPLY

The unit operates from a 9 Volt dry battery, it is recommended that only Alkaline cells be used. The audio circuits are fed directly while the transmitter / receiver circuits are via a nominal 5V regulator formed around TR1.

The unit is turned on by a membrane which is mounted on the probe cover. Closing the switch grounds the gate of VFET TR2. The unit turns off when the switch contacts are released. Some models are fitted with a latch 'On' circuit. These models stay On for approximately 5 minutes after which they turn Off automatically.

3.2.1 BATTERY LOW INDICATOR

IC2a is connected a voltage comparator with D2 as the reference voltage. When the power rail falls below the threshold set by R6 & R7 the LED1 turns on indicating that the battery requires changing.

3.2.2 ULTRASOUND TRANSDUCER

The ultrasound transducer operates on the continuous wave Doppler principle and consists of a single half disc transmitter crystal whose beam is focused by angling and a half disc receiver crystal. The transducer operates at a nominal frequency of 2.0, 5.4 or 8 MHz.

3.2.3 OSCILLATOR AND DETECTOR

The oscillator and detector is built up of four discrete sections. These are the master oscillator, transmitter amplifier, receiver amplifier and detector.

These operate to produce a continuous wave ultrasound signal that is passed to the transmitting crystal in the transducer.

The signal is then reflected from moving interfaces within the body to the receiver crystal in the transducer, amplified and then detected so the audio doppler shift of that moving interface can be heard audibly and / or converted into a velocity signal.

3.2.4 OSCILATOR AND TRANSMITTER AMPLIFIER

Field effect transistor TR1, with L1, C2, C3 and associated components form a Colpitts oscillator. This oscillator runs at a nominal frequency of 2, 5.4 or 8MHz producing a sinewave of amplitude of approximately 2V. This signal is then fed to output transistor TR2 which drives the transmitter crystal in the transducer.

The output power is varied by adjustment of VR1 during test. The signal is fed to the transducer via a tuned transformer L2 (C5), the output impedance of which is set correctly to match the transducer crystal impedance.

3.2.5 RECEIVER AND DETECTOR

The reflected Doppler signal is fed via a resonant transformer L3 (C9) to the gate of TR4, the drain of this FET connects to the source of TR3 to form a cascode amplifier the drain of which contains the resonant circuit L4, (C8).

From the drain of TR3 the amplitude complex of the received signal is detected by passing the signal through diode D1 with the high frequency signals being filtered by R7 and C10, their frequency breakpoint being at 1kHz.

The raw low frequency heart complex is then amplified and filtered by IC1 where its associated components form a bandpass filter amplifier with a bandwidth of 150Hz to 1KHz for the obstetrics or 300Hz to 4KHz in the vascular transducer. This signal is passed to the audio unit via the coiled cable.

3.2.6 AUDIO AMPLIFIER

After the audio signal has been detected in the transducer it is routed via the curly cable to PL1 pin 2 on the audio circuit board, here it splits to feed the velocity processor, tape recorder jack and via the volume control VR1 to the audio power amplifier IC1, which feeds the loudspeaker.

3.2.7 VELOCITY PROCESSOR

One half of Op-Amp IC2B forms a buffer amplifier to the incoming signal with a gain of 100. This amplified signal is then passed via the threshold control VR3 to the frequency to voltage converter IC3. The conversion factor is approximately 70mV/kHz with fine adjustment provided by VR4.

The output of this circuit is then scaled by R19,20 to 1mV/kHz, a suitable voltage level for most ECG machines and recorders.

3.3 CONTROLS AND INDICATORS

3.3.1 UNIT ON / OFF

A membrane switch is situated on the probe, this switch grounds the gate of FET TR2 connecting the circuits to the power source, releasing the switch will turn the unit off.

On later models a latch circuit has been provided; depressing the switch once, switches the unit ON, depressing the switch a second time switches the unit OFF. The latch circuit also has a time out period of approximately 5 minutes.

3.3.2 BATTERY LOW

The LED illuminates when the rail voltage from the battery falls too low for continued operation, indicating that the battery should be changed.

SECTION 4

TEST AND CALIBRATION

4.1 INTRODUCTION

The following sections details tests to ensure that the unit is operating within specification. These tests may be performed in whole or part, however, if any repairs are carried out to the power supply circuits then it is recommended that the whole test / calibration procedure is undertaken.

4.1.2 PERFORMANCE CHECKS

The following procedure is intended to provide a means of determining the functional status of the unit. It should be included as part of a preventative maintenance plan and should be performed on a regular basis at least once a year.

Ensure that a full capacity alkaline cell is fitted .

Connect the transducer to the unit and press the switch to turn the unit on. Increase the volume to to maximum. The battery low light will flash ON for about 5 seconds and then go out.

Place transducer with ultrasound gel on the palm of the hand over the radial artery , a clear pulse will be heard.

4.2 TEST PROCEDURE

4.2.1 EQUIPMENT

Oscilloscope 2 channel 50 MHz bandwidth minimum resolution 5mV/cm

Digital Multimeter 4 Digit measuring 1mV , 1mA , 0.1ohm

Frequency Counter 0 - 10MHz resolution at 2MHz 1KHz.

Signal Generator 10Hz to 10MHz 1mV to 10V Sinewave

4.2.2 AUDIO UNIT POWER SUPPLY

Connect a DC voltage source adjusted to 9V + 50mV in place of the dry battery and shorting link between pins 3 and 4 on the connector PL1.

Place multimeter probes across C3. The voltage at this point must be no more than 0.2V less than input voltage from the DC power source.

4.3 BATTERY LOW INDICATOR

NOTE: DURING THESE TESTS C13 MUST BE REMOVED FROM THE CIRCUIT.

Connect multimeter negative (-ve) probe to C3 -ve

Reduce DC Power source to give 7.0V (+10mV) at C3 +ve and adjust VR2 until LED D3 just turns on. The voltage at IC2 pin1 must be greater than 5 volts.

Increase voltage to give 7.2 V (+ 10mV) at C3 +ve and LED D3 must turn OFF. The voltage at IC2 pin1 must be less than 2.9V.

Connect C13 into the circuit and adjust the DC power source for 7.0V (+/-10mV) at C3 +ve. The LED D3 must light within 20 seconds.

Increase the voltage to 7.2V (+10mV) at C3 +ve and the LED D3 must turn off within 20 seconds.

4.4 ACTIVE REGULATOR

Connect 270 ohm 0.5 watt resistor between pins 1 and 4 on the connector PL1.
With DC input voltage at C3 +ve set to 7.6V (+10mV) attach multimeter probe to PL1 pin1 (yellow wire). The voltage must be between 4.6 and 5.2 volts.

Increase DC input voltage to 9V (+50mV). With the multimeter still attached to PL1 pin 1 the DC voltage must not rise to greater than 5.6 Volts.

4.5 AUDIO

Connect 8 ohm 1 watt resistor in place of the loudspeaker between pins 5 and 6 on the connector PL1 and using the A.F. signal generator inject a 500Hz sinewave of 100mv peak to peak into junction of VR1 and C6. Set VR1 to Maximum.

Connect oscilloscope across 8 ohm resistor and with the voltage at C3 +ve set to between 8.6 and 9v the resulting signal must be between 4.0 and 4.8 Volts peak to peak, with no visible distortion.

Increase input signal until the signal clips. The measured voltage must be greater than 7 volts pk-pk.

4.6 VELOCITY PROCESSOR

With oscilloscope set to AC input adjust input signal from audio generator to a frequency of 1kHz and an amplitude of 15mV + 1mV pk-pk at pin 6 IC2B.

Move probe to pin 7 IC2B the voltage will be in the range 1.2 - 1.8V pk-pk.

Set frequency to 10KHz and attach oscilloscope to pin 7 IC3 and adjust VR3 until IC3 Pin 7 just changes state from 0V to D.C. level between 400 - 900mV. The signal will be rough DC.

Using the multimeter with -ve probe connected to C3 -ve and +ve probe to the junction of R18, R19 and C19, adjust VR4 until the DC level measures 700 mV +/- 2mV.

Set the frequency to 1KHz and check that the multimeter now reads 70mV + 4mV

4.7 TRANSDUCER OSCILLATOR AND TRANSMITTER

Using the multimeter measure the voltdrop across R6. This must be no greater than 0.6 V dc.

Turn VR1 fully anticlockwise and connect the oscilloscope to TP1, the signal must be an undistorted sinewave of 1.7 to 2.2 Mhz (or 5.4 & 8mhz depending on transducer) and of amplitude greater than 1.7V.

Replace oscilloscope with the frequency counter and adjust L1 for the correct operating frequency of the crystal faceplate at TP4 .

Using the oscilloscope connected across output to the transmitter crystal (TS1, TS2 on edge of PCB). Adjust VR1 and peak L2 to result in an output of 1.5V pk - pk.

4.8 TANSDUCER RECEIVER AND DETECTOR

Attach oscilloscope probe to the drain of TR3 (TP5) and adjust L3 and L4 for maximum signal.

Move oscilloscope probe to junction of D1 and R7 (TP7). The measured output will be a DC voltage of greater than 5.5V.

SECTION 5

FAULT FINDING

5.1 FAULT FINDING GUIDELINES

This section is an aid to trouble shooting and should be used in conjunction with the relevant circuit diagrams found at the rear of this manual (Section 7). In each case the recalibration must be carried out after any repair.

The following tables list some of the symptoms and the relevant circuit areas.

NOTE Do not, under any circumstances attempt to repair the instrument whilst it is connected to a patient.

5.1.2 ULTRASOUND

Symptom	Suspect Circuit	Check
Ultrasound does not function	Transducer	Try another transducer
	Transmitter / Receiver	Transmitter drive TS1, TS2 3V pk/pk. See Ultrasound calibration tests
	Unit On / Off circuit	Gate of TR1 in audio circuit
Ultrasound OK but no audio	Transducer position	Re position transducer
	Crackling operation of volume control VR1	Replace volume control
	Broken conductor in cable	Check audio signal on pin 3 of IC 1
	Headphone socket SK2	Audio signal on PL1 pin 5
		Loudspeaker

5.1.3 AUDIO UNIT

Symptom	Suspect Circuit	Check
Unit does not switch ON	Remote switch on transducer	PL1 pin 3 goes low when switch depressed
	TR2 V FET	Gate goes low when switch depressed. Source goes to 0.2V of Drain

	Battery	PL1 pin 7 > 7V
Battery Low LED on permanently	Battery condition	PL1 pin 7 > 7V
	IC2 A Comparator	See test / calibration section
Excessive battery drain	Turn Off circuit TR2	Gate of TR2 must be at same level as drain Change battery
Unit unstable	Ultrasound transducer	Replace transducer
	TR2	Emitter - 5V Collector > 7V
	Battery condition	PL1 pin 7 > 7V

SECTION 6**PARTS LISTS**

PART No.	DESCRIPTION
0120-0003	AUDIO UNIT ASSEMBLY
0120-8205	AUTO OFF AUDIO VELOCITY PCB ASSEMBLY
0120-0004	DEDICATED 2MHz ASSEMBLY
0120-8201	AUDIO PCB ASSEMBLY
0120-0002	2 MHz TRANSDUCER ASSEMBLY
0120-8202	2 MHz TRANSDUCER PCB ASSEMBLY
0120-0007	5.4 MHz TRANSDUCER ASSEMBLY
0120-8204	5.4 MHz TRANSDUCER PCB ASSEMBLY
0120-0038	8 MHz TRANSDUCER ASSEMBLY
0120-8207	8 MHz TRANSDUCER PCB ASSEMBLY

0120-0003 AUDIO UNIT ASSEMBLY

Part No.	Qty	Description
0120-1003	1	PD120 Front Cover - Stainless
0120-1004	1	PD120 Rear Cover - Stainless
0120-1005	1	PD120 Clip Blanking Plate
0120-1010	1	PD120 Pocket Clip
0120-1401	1	PD120 Pocket Clip Spring
0120-3414	1	PD120 Body Moulding
0120-3415	1	PD120 Battery Slide
0120-3425	4	PD120 Speaker Clamps
0120-8203	1	PD120 Audio/Velocity PCB Assembly
5211-0008	1	Molex Housing 8 way
5250-0000	8	Molex Crimps
5504-0004	1	Lemo Socket 4 way EGG0B304CNL
5810-0000	1	Battery Connector PP3
6520-0225	1	Loudspeaker round 2.25inc
7000-0100	103	Wire 7/0.2 Single White Lemo 103mm
7000-0200	115	Wire 7/0.2 Single Pink Loudspeaker 115mm
7000-1000	195	Wire 7/0.2 Single Black Loudspeaker 92mm - Lemo 103mm
7000-3000	103	Wire 7/0.2 Single Red Lemo 103mm
7000-5000	103	Wire 7/0.2 Single Yellow Lemo 103mm
7071-0010	28	Sleeving Helsin 1mm 4 Lengths of 7mm
7151-1306	2	Screw Stainless PAN M3x6mm
7151-4506	4	Screw Self Tap PAN N4x1/4in (type B)
7153-1306	3	Screw Stainless CSK M3x6mm
7400-0001	2	Tyrap short type PLT1M
7704-0002	1	Spirol Pin Stainless 302 1/16 x 13/16
7711-3001	5	Insert Brass Sonicloc M3 Short
7900-0002	0	Adhesive Evostick Clear

0120-8205 AUTO OFF AUDIO VELOCITY PCB ASSEMBLY (fitted to units with an interchangeable transducer only)

Part No.	Qty	Description
0120-3405	1	Audio PCB (un populated)
0120-3422	1	PD120 Volume Spacer Spacer for VR1
1101-0010	1	Resistor LR1 1% 1R R5
1101-0102	4	Resistor LR1 1% 1KO R2,8,17,20
1101-0103	2	Resistor LR1 1% 10K R1,18

1101-0104	1	Resistor LR1 1% 100K R10
1101-0105	3	Resistor LR1 1% 1MO R22,23,25
1101-0121	1	Resistor LR1 1% 120R R4
1101-0222	1	Resistor LR1 1% 2K2 R13
1101-0223	1	Resistor LR1 1% 22K R15
1101-0224	3	Resistor LR1 1% 220K R11,12,14
1101-0273	1	Resistor LR1 1% 27K R6
1101-0275	1	Resistor LR1 1% 2M7 R24
1101-0333	1	Resistor LR1 1% 33K R16,
1101-0391	1	Resistor LR1 1% 390R R21
1101-0560	1	Resistor LR1 1% 56R R3
1101-0561	1	Resistor LR1 1% 560R R9
1101-0683	2	Resistor LR1 1% 68K R19,R7
1330-0103	2	Singleturn Pot. 10K VR3,4
1810-0103	1	Volume Rotary Edge 10K LOG (PC 908) VR1
2120-0108	1	Electrolytic 1000uf 10V Axial C3
2220-0107	7	Electrolytic 100uF 10V C1,2,7,9,12,13,23
2220-0476	1	Electrolytic 47uF 10V 509D C8
2260-0225	1	Electrolytic 2.2uF 50V 509D C19
2350-0105	1	Tantalum 1uF 35V 499D C15
2564-0228	1	Polyester 10% 220nF C11
2564-0478	2	Polyester 10% 470nF C18,22
2770-0472	1	Ceramic Axial 4700pF 50/100V C10
2870-0103	2	Ceramic Radial 10nF 100V C14,20
2870-0104	4	Ceramic Radial 100nF 100V C4,5,6,24
2870-0473	1	Ceramic Radial 47nF C16
2960-0390	1	Polystyrene 390pF

		C17
4120-4148	3	Diode 1N4148 D3,5,6
4140-0051	1	Diode Zener BZX79 B5V1 2% D2
4140-0056	2	Diode Zener BZX79 C5V6 D1,4
4160-0181	1	Varistor S10V-S07K11 Fit across R 10
4210-0183	1	Transistor BC183C TR1
4250-0300	1	FET V-Type VPO300M TR2
4310-0820	1	Analogue IC - TBA820M IC1
4310-1458	1	Analogue IC - MC1458 CP IC2
4310-2907	1	Analogue IC - LM2907N8 IC3
4312-7555	1	Analogue Surface Mount IC - ICM7555 IBA IC5
4322-4013	1	CMOS Surface Mount IC - MC14013BD IC4
4410-0540	1	Led Single Yellow 2mm LED1
5222-0008	1	Molex Wafer Right Angle 8 way PL1
5404-2001	2	Jack Socket 3.5mm Stereo pc

0120-0004 2MHz DEDICATED ASSEMBLY

Part No.	Qty	Description
0120-1003	1	PD120 Front Cover - Stainless
0120-1004	1	PD120 Rear Cover - Stainless
0120-1005	1	PD120 Clip Blanking Plate
0120-1010	1	PD120 Pocket Clip
0120-1401	1	PD120 Pocket Clip Spring
0120-1502	1	PD120 Probe Membrane Switch
0120-3276	1	PD120 Probe Cable Clamp
0120-3414	1	PD120 Body Moulding
0120-3415	1	PD120 Battery Slide
0120-3418	1	PD120 Probe Cover
0120-3425	4	PD120 Speaker Clamps
0120-5001	1	PD120 Retractable Cable
0120-8201	1	PD120-OB Audio Circuit Assembly
0120-8503	1	2MHz Cradle assy
5211-0008	1	Molex Housing 8 way
5250-0000	8	Molex Crimps
5810-0000	1	Battery Connector PP3
6500-0001	1	Speaker Cloth 65mm x 65mm
6520-0225	1	Loudspeaker round 2.25inc
7000-0200	115	Wire 7/0.2 Single Pink Loudspeaker 115mm
7000-1000	92	Wire 7/0.2 Single Black Loudspeaker 92mm
7111-1112	2	Screw Plated Brass PAN M2x12
7151-1306	2	Screw Stainless PAN M3x6mm
7151-4105	2	Screw Self Tap PAN N2x3/16in
7151-4506	4	Screw Self Tap PAN N4x1/4in (type B)
7153-1306	3	Screw Stainless CSK M3x6mm
7400-0001	3	Tyrap short type PLT1M
7441-2660	1	Grommet Extended Black Rubber
7441-3332	1	Grommet Extended Black Rubber
7704-0002	1	Spirol Pin Stainless 302 1/16 x 13/16
7711-3001	5	Insert Brass Sonicloc M3 Short
7900-0002	1	Adhesive Evostick Clear 0.05gm
7900-0007	1	Silastic Corning 3140 RTV 0.005gm
7900-0011	1	Double Sided Tape Pads

0120 8201 AUDIO PCB ASSEMBLY (fitted to FETATRACK variant only)

Part No.	Qty	Description
0120-3404	1	PD120 Audio PCB
0120-3422	1	PD120 Volume Spacer Spacer for VR1
1101-0010	1	Resistor LR1 1% 1R R5
1101-0102	2	Resistor LR1 1% 1KO R2,8
1101-0103	1	Resistor LR1 1% 10K R1
1101-0104	1	Resistor LR1 1% 100K R10
1101-0121	1	Resistor LR1 1% 120R R4
1101-0224	3	Resistor LR1 1% 220K R11,12,14
1101-0273	1	Resistor LR1 1% 27K R6
1101-0560	1	Resistor LR1 1% 56R R3
1101-0561	1	Resistor LR1 1% 560R R9
1101-0683	1	Resistor LR1 1% 68K R7 and link VR2
1810-0103	1	Volume Rotary Edge 10K LOG (PC 908) VR1
2120-0108	1	Electrolytic 1000uf 10V Axial C3
2220-0107	6	Electrolytic 100uF 10V C1,2,7,9,12,13
2220-0476	1	Electrolytic 47uF 10V 509D C8
2564-0228	1	Polyester 10% 220nF C11
2770-0472	1	Ceramic Axial 4700pF 50/100V C10
2870-0103	1	Ceramic Radial 10nF 100V C14
2870-0104	3	Ceramic Radial 100nF 100V C4,5,6
4120-4148	1	Diode 1N4148 D3
4140-0051	1	Diode Zener BZX79 B5V1 2%
4140-0056	1	Diode Zener BZX79 C5V6 D1
4160-0181	1	Varistor S10V-S07K11

		Fit across R 10
4210-0183	1	Transistor BC183C TR1
4250-0300	1	FET V-Type VPO300M TR2
4310-0820	1	Analogue IC - TBA820M IC1
4310-1458	1	Analogue IC - MC1458 CP IC2
4410-0540	1	Led Single Yellow 2mm LED1
5222-0008	1	Molex Wafer Right Angle 8 way PL1
5404-2001	2	Jack Socket 3.5mm Stereo pc JK1,2

0120-0002 2 Mhz TRANSDUCER

Part No.	Qty	Description
0120-1502	1	Probe Membrane Switch
0120-1520	1	30/Series Serial number Label
0120-3276	1	PD120 Probe Cable Clamp
0120-3418	1	PD120 Probe Cover
0120-8402	1	PD120 Retractable Cable Assembly
0120-8503	1	2MHz Cradle assy
7111-1112	2	Screw Plated Brass PAN M2x12
7151-4105	2	Screw Self Tap PAN N2x3/16in
7441-3332	1	Grommet Extended Black Rubber
7900-0011	1	Double Sided Tape Pads

0120-8202 2 MHz TRANSDUCER PCB ASSEMBLY

Part No.	Qty	Description
0120-3410	1	PD120 Probe RF PCB
1201-0100	1	Resistor RGP0204 1% 10R R3
1201-0101	1	Resistor RGP0204 1% 100R R8
1201-0102	1	Resistor RGP0204 1% 1K R11
1201-0220	1	Resistor RGP0204 1% 22R R6
1201-0224	6	Resistor RGP0204 1% 220K R4,5,7,9,10,12
1201-0272	1	Resistor RGP0204 1% 2K7 R2
1201-0682	1	Resistor RGP0204 1% 6K8 R1
1330-0102	1	Singleturn Pot. 1K VR1
2220-0107	1	Electrolytic 100uF 10V C15
2250-0474	1	Electrolytic 0.47uF 50V C13
2330-0106	1	Tantalum 10uF 16V 499D C1
2564-0228	1	Polyester 10% 220nF C14
2564-4710	1	Polyester 10% 4n7 C11
2770-0122	2	Ceramic Axial 1200pF 50/100V C2,5
2770-0221	1	Ceramic Axial 220pF 50/100V C9
2770-0222	1	Ceramic Axial 2200pF 50/100V

		C16
2770-0271	1	Ceramic Axial 270pF 50/100V
		C3
2770-0681	1	Ceramic Axial 680pF 50/100V
		C8
2870-0103	1	Ceramic Radial 10nF 100V
		C4
2870-0104	2	Ceramic Radial 100nF 100V
		C7,12
2870-0681	1	Ceramic Radial 680pF 100V
		C10
3005-0838	1	Inductor 5S 0838 Toko
		L3
3005-0841	1	Inductor 5S 0841 Toko
		L1
3005-0842	1	Inductor 5S 0842 Toko
		L4
3005-0876	1	Inductor 5S 0876 Toko
		L2
4110-0085	1	Diode BAT85
		D1
4210-0182	1	Transistor BC182
		TR2
4230-0256	3	FET M-Type BF256A
		TR1,3,4
4310-0071	1	Analogue IC - TL071CP
		IC1
5222-0002	1	Molex Wafer Right Angle 2 way
		PL1

0120-0007 5.4 MHz TRANSDUCER

Part No.	Qty	Description
0120-1505	1	PD120 Vascular Probe Switch 5.4 MHz
0120-1521	1	31/Series Serial Number Label
0120-3276	1	PD120 Probe Cable Clamp
0120-3418	1	PD120 Probe Cover
0120-8402	1	PD120 Retractable Cable Assembly
0120-8504	1	5.4MHz Cradle assy
7111-1112	2	Screw Plated Brass PAN M2x12
7151-4105	2	Screw Self Tap PAN N2x3/16in
7441-3332	1	Grommet Extended Black Rubber
7900-0007	1	Silastic Corning 3140 RTV
7900-0011	1	Double Sided Tape Pads

0120-8204 5.4 MHZ TRANSDUCER PCB ASSEMBLY

Part No.	Qty	Description
0120-3410	1	PD120 Probe RF PCB
1201-0100	1	Resistor RGP0204 1% 10R R3
1201-0101	1	Resistor RGP0204 1% 100R R8
1201-0102	1	Resistor RGP0204 1% 1K R11
1201-0220	1	Resistor RGP0204 1% 22R R6
1201-0224	6	Resistor RGP0204 1% 220K R4,5,7,9,10,12
1201-0272	1	Resistor RGP0204 1% 2K7 R2
1201-0682	1	Resistor RGP0204 1% 6K8 R1
1330-0102	1	Singleturn Pot. 1K VR1
2220-0107	1	Electrolytic 100uF 10V C15
2250-0474	1	Electrolytic 0.47uF 50V C13
2330-0106	1	Tantalum 10uF 16V 499D C1
2564-0228	1	Polyester 10% 220nF C14
2564-4710	1	Polyester 10% 4n7 C11
2770-0101	1	Ceramic Axial 100pf 50/100 C8
2770-0102	1	Ceramic Axial 1000pF 50/100V

		C16
2770-0181	1	Ceramic Axial 180pF/100V
		C5
2770-0330	1	Ceramic Axial 33pF 50/100
		C9
2770-0470	1	Ceramic Axial 47pF 50/100V
		C3
2870-0103	1	Ceramic Radial 10nF 100V
		C4
2870-0104	2	Ceramic Radial 100nF 100V
		C7,12
2870-0681	1	Ceramic Radial 680pF 100V
		C10
2870-0820	1	Ceramic Radial 82pF 50/100V
		C2
3005-0838	1	Inductor 5S 0838 Toko
		L3
3005-0841	1	Inductor 5S 0841 Toko
		L1
3005-0842	1	Inductor 5S 0842 Toko
		L4
3005-0876	1	Inductor 5S 0876 Toko
		L2
4110-0085	1	Diode BAT85
		D1
4210-0182	1	Transistor BC182
		TR2
4230-0256	3	FET M-Type BF256A
		TR1,3,4
4310-0071	1	Analogue IC - TL071CP
		IC1
5222-0002	1	Molex Wafer Right Angle 2 way

0120-0038 8 MHz TRANSDUCER

Part No.	Qty	Description
0120-1522	1	32/Serial Serial Number Label
0120-1524	1	PD120 Vascular Probe Switch 8 MHz
0120-3276	1	PD120 Probe Cable Clamp
0120-3418	1	PD120 Probe Cover
0120-8402	1	PD120 Retractable Cable Assembly
0120-8506	1	8MHz Cradle assy
7111-1112	2	Screw Plated Brass PAN M2x12
7151-4105	2	Screw Self Tap PAN N2x3/16in
7441-3332	1	Grommet Extended Black Rubber
7900-0011	1	Double Sided Tape Pads

0120-8207 8 MHz TRANSDUCER PCB ASSEMBLY

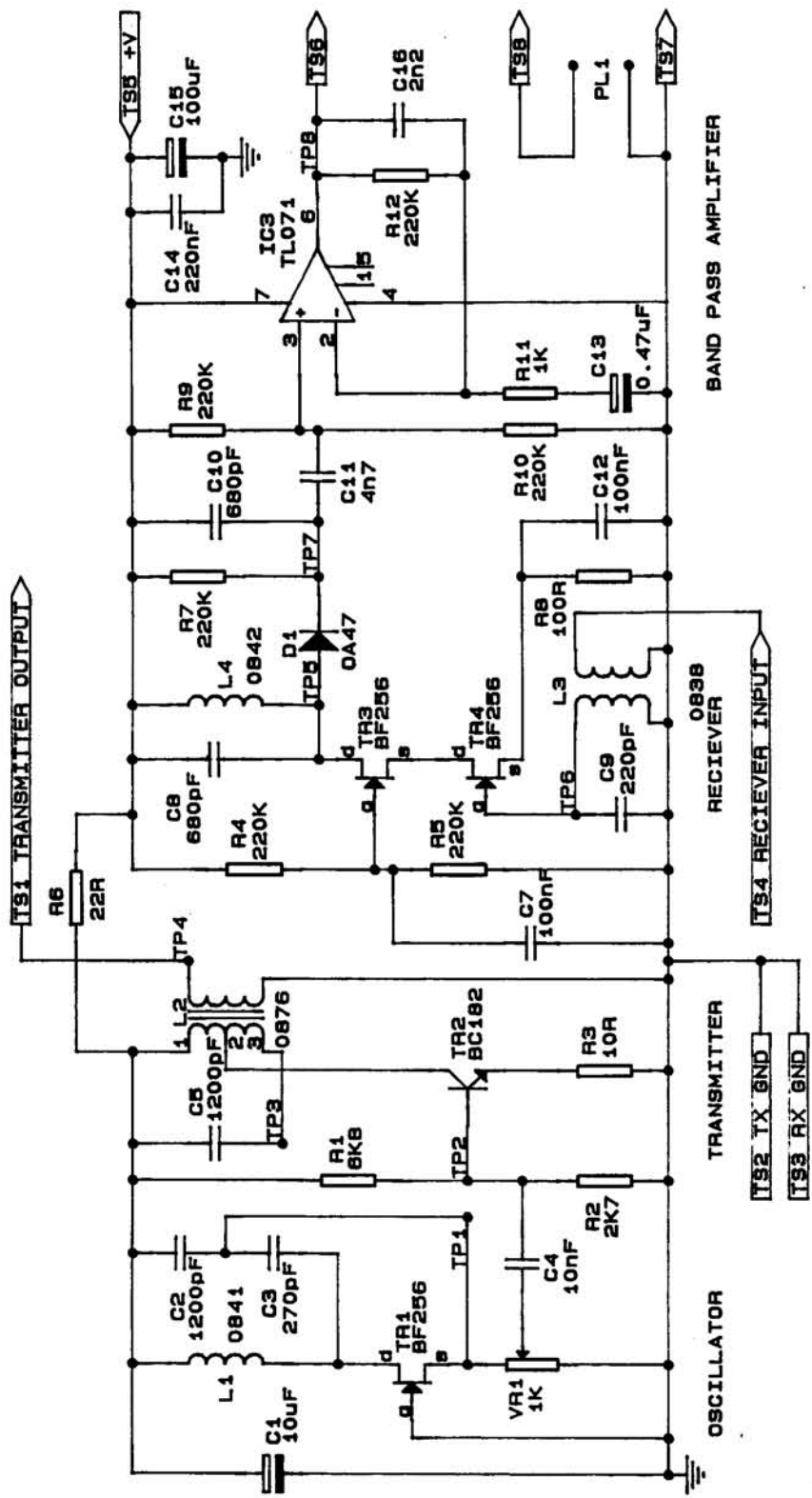
Part No.	Qty	Description
0120-3410	1	PD120 Probe RF PCB
1201-0100	1	Resistor RGP0204 1% 10R R3
1201-0101	1	Resistor RGP0204 1% 100R R8
1201-0102	1	Resistor RGP0204 1% 1K R11
1201-0220	1	Resistor RGP0204 1% 22R R6
1201-0224	6	Resistor RGP0204 1% 220K R4,5,7,9,10,12
1201-0272	1	Resistor RGP0204 1% 2K7 R2
1201-0682	1	Resistor RGP0204 1% 6K8 R1
1330-0102	1	Singleturn Pot. 1K VR1
2220-0107	1	Electrolytic 100uF 10V C15
2250-0474	1	Electrolytic 0.47uF 50V C13
2330-0106	1	Tantalum 10uF 16V 499D C1
2564-0228	1	Polyester 10% 220nF C14
2564-4710	1	Polyester 10% 4n7 C11
2770-0102	1	Ceramic Axial 1000pF 50/100V C16
2770-0180	1	Ceramic Axial 18pF 50/100V C9
2770-0271	1	Ceramic Axial 270pF 50/100V

		C2
2770-0330	1	Ceramic Axial 33pF 50/100
		C8
2770-0470	1	Ceramic Axial 47pF 50/100V
		C3
2870-0103	1	Ceramic Radial 10nF 100V
		C4
2870-0104	2	Ceramic Radial 100nF 100V
		C7,12
2870-0681	1	Ceramic Radial 680pF 100V
		C10
2870-0820	1	Ceramic Radial 82pF 50/100V
		C5
3005-0838	1	Inductor 5S 0838 Toko
		L3
3005-0842	2	Inductor 5S 0842 Toko
		L1,L4. Link pins 1 and 2 on L1
3005-0876	1	Inductor 5S 0876 Toko
		L2
4110-0085	1	Diode BAT85
		D1
4210-0182	1	Transistor BC182
		TR2
4230-0256	3	FET M-Type BF256A
		TR1,3,4
4310-0071	1	Analogue IC - TL071CP
		IC1
5222-0002	1	Molex Wafer Right Angle 2 way
		PL1

SECTION 7**DRAWINGS AND CIRCUIT DIAGRAMS**

The following is a list of schematic diagrams applicable to this section :-

0120-8202	2 MHZ Transducer Scematic
0120-8204	5.4 MHz Transducer Schematic
0120-8207	8 MHz Transducer Schematic
0120-8201	PD 120 Audio PCB Overlay
0120-8201	PD 120 Audio Velocity Schematic
0120-8205	PD 120 Auto / Off Audio Velocity Schematic



Title			WAKELING MEDICAL		
Size			2Mhz. PROBE CIRCUIT DIAGRAM		
Document Number			REV		
A			0120-8202		
Date:			May 30, 1991		
Sheet			1 of 1		

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UNDERSIDE VIEW



SEWARD MEDICAL SYSTEMS

1171

8 MHz TRANSDUCER CIRCUIT DIAGRAM

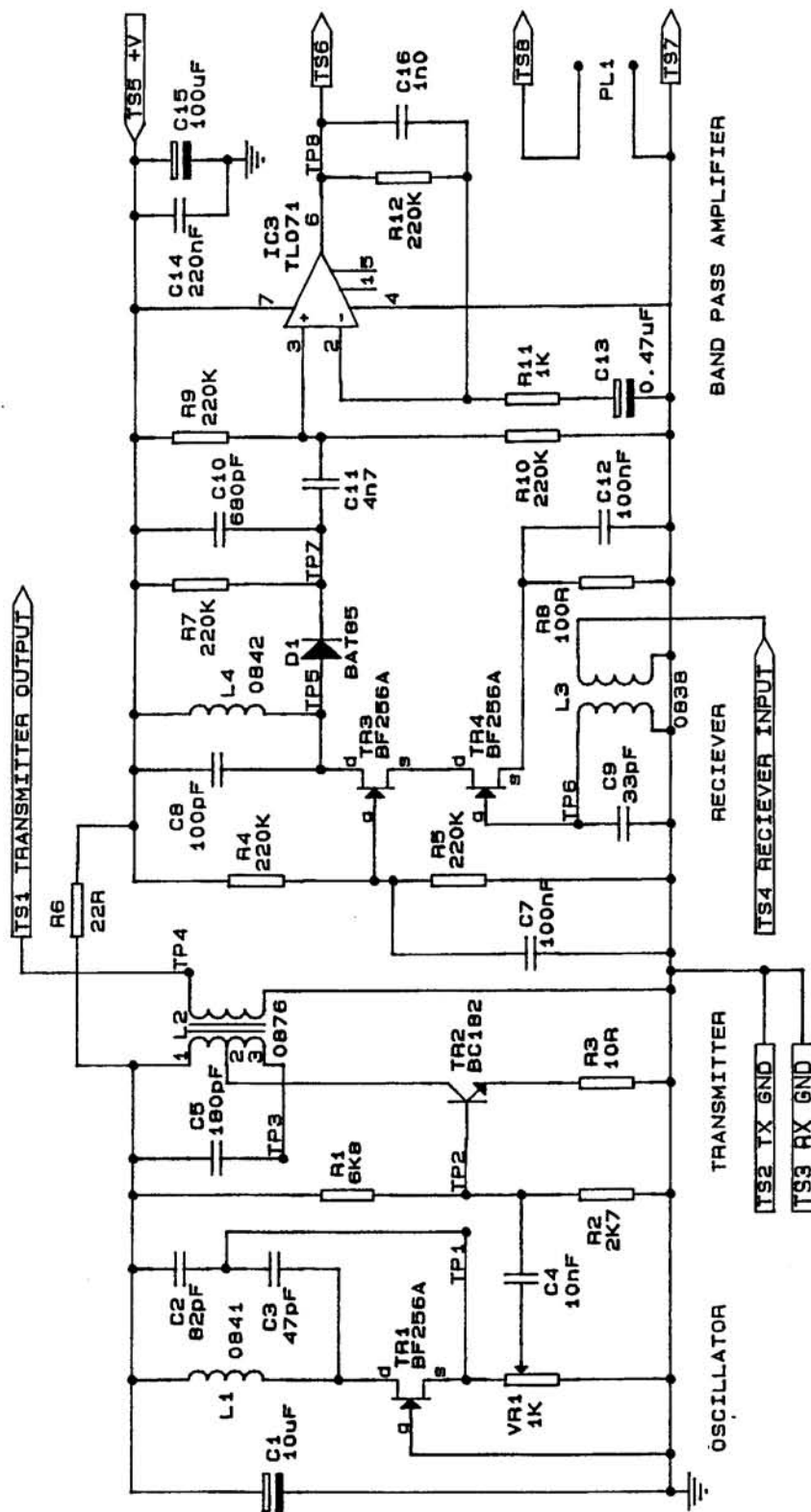
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WAKELING MEDICAL

Title

6.4 Mhz. PROBE CIRCUIT DIAGRAM

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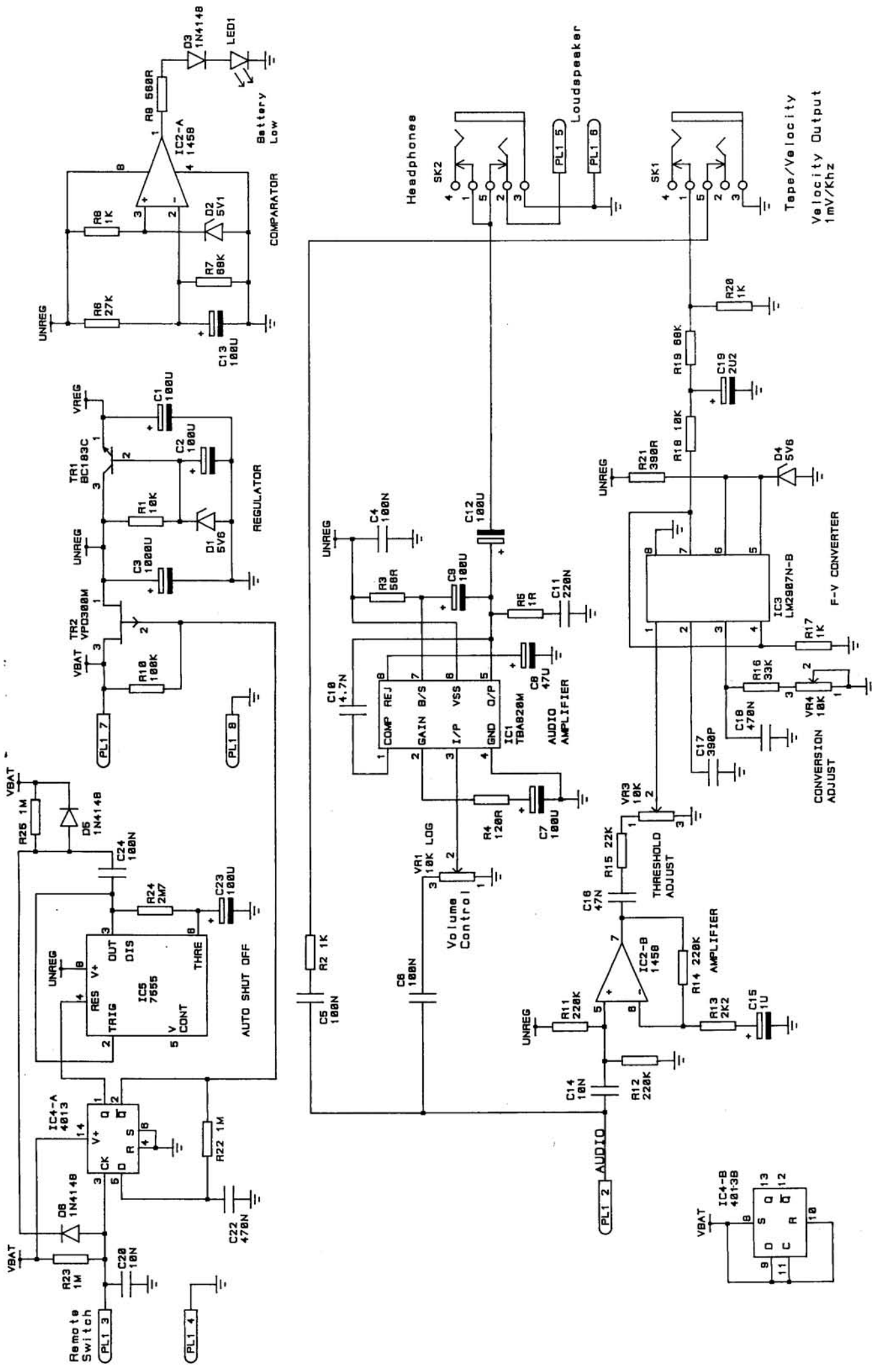
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Date: November 25, 1991 Sheet 1 of 1

250 11.94 4 WH

217 05.91 3 WH

ECN DATE ISS DRAWN



DRAWN CREST	COPYRIGHT WAKELING MEDICAL LTD. 1991	NOTES: -	ISSUE 1. 5-7-91.	DATE -	DESCRIPTION -	CIRCUIT DIAGRAM FOR:- PD120 AUDIO/VELOCITY CIRCUIT SH. 1 OF 1	DRAWING NUMBER 0120-8205 WAKELING MEDICAL LTD.
CHECKED DATE 05/08/91.	LAST COMPONENT USED:-						